

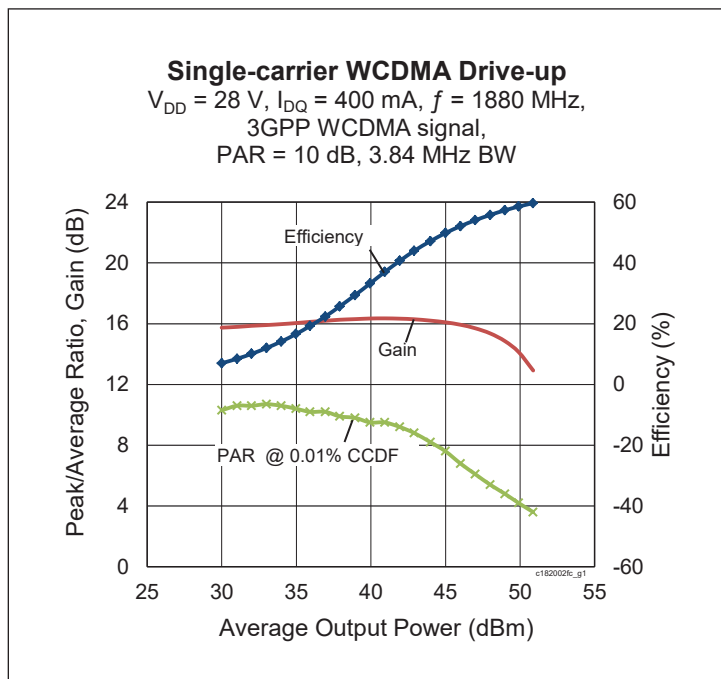
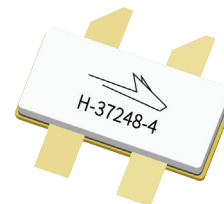
PXAC182002FC

Thermally-Enhanced High Power RF LDMOS FET 180 W, 28 V, 1805 – 1880 MHz

Description

The PXAC182002FC is a 180-watt LDMOS FET with an asymmetrical design intended for use in multi-standard cellular power amplifier applications in the 1805 to 1880 MHz frequency band. Features include dual-path design, input and output matching, high gain and thermally-enhanced package with earless flanges. Manufactured with Wolfspeed's advanced LDMOS process, this device provides excellent thermal performance and superior reliability.

PXAC182002FC
Package H-37248-4



Features

- Broadband internal input and output matching
- Asymmetrical Doherty design
 - Main: 70 W Typ (P_{1dB})
 - Peak: 110 W Typ (P_{1dB})
- Typical pulsed CW performance, 1880 MHz, 28 V, combined outputs
 - Output power at $P_{3dB} = 194\text{ W}$
 - Efficiency = 64%
 - Gain = 14 dB
- Capable of handling 10:1 VSWR @ 28 V, 110 W (CW) output power
- Integrated ESD protection
- Human Body Model Class 1C (per ANSI/ESDA/ JEDEC/JS-001)
- Low thermal resistance
- Pb-free and RoHS compliant

RF Characteristics

Single-carrier WCDMA Specifications (tested in Wolfspeed Doherty test fixture)

$V_{DD} = 28\text{ V}$, $I_{DQ} = 400\text{ mA}$, $V_{GSPEAK} = 1.1\text{ V}$, $P_{OUT} = 28.2\text{ W avg}$, $f = 1880\text{ MHz}$, 3GPP signal, channel bandwidth = 3.84 MHz, peak/average = 10 dB @ 0.01% CCDF

| Characteristic | Symbol | Min | Typ | Max | Unit |
|------------------------------|----------|------|------|-----|------|
| Gain | G_{ps} | 15.5 | 16.5 | — | dB |
| Drain Efficiency | η_D | 48.5 | 51 | — | % |
| Adjacent Channel Power Ratio | ACPR | — | -30 | -26 | dBc |

All published data at $T_{CASE} = 25^\circ\text{C}$ unless otherwise indicated

ESD: Electrostatic discharge sensitive device—observe handling precautions!

DC Characteristics (each side)

| Characteristic | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------|------------------------------------------------------|---------------|------|-------|------|---------------|
| Drain-Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_{DS} = 10\text{ mA}$ | $V_{(BR)DSS}$ | 65 | — | — | V |
| Drain Leakage Current | $V_{DS} = 28\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 0.1 | μA |
| | $V_{DS} = 63\text{ V}, V_{GS} = 0\text{ V}$ | I_{DSS} | — | — | 1.0 | μA |
| On-State Resistance (main) | $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.18 | — | Ω |
| | (peak) $V_{GS} = 10\text{ V}, V_{DS} = 0.1\text{ V}$ | $R_{DS(on)}$ | — | 0.135 | — | Ω |
| Operating Gate Voltage (main) | $V_{DS} = 28\text{ V}, I_{DQ} = 400\text{ mA}$ | V_{GS} | 2.55 | 2.65 | 2.75 | V |
| | (peak) $V_{DS} = 28\text{ V}, I_{DQ} = 0\text{ A}$ | V_{GS} | 0.9 | 1.2 | 1.3 | V |
| Gate Leakage Current | $V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$ | I_{GSS} | — | — | 0.1 | μA |

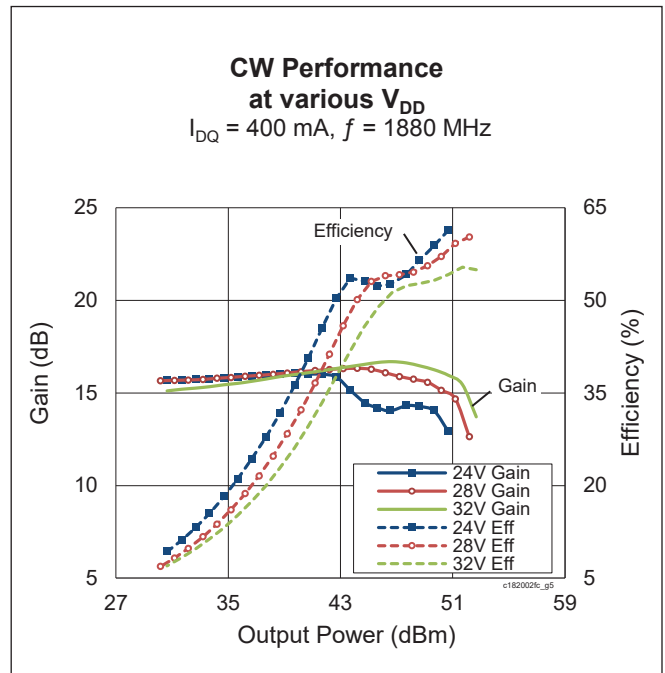
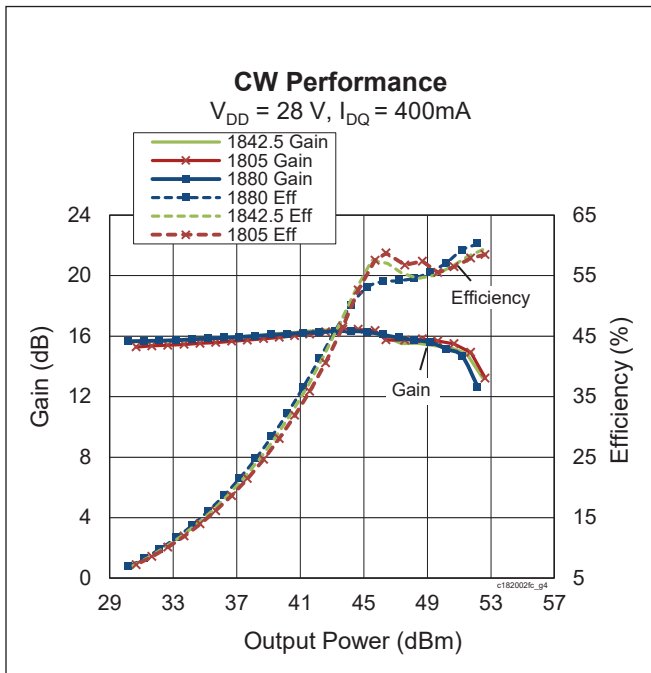
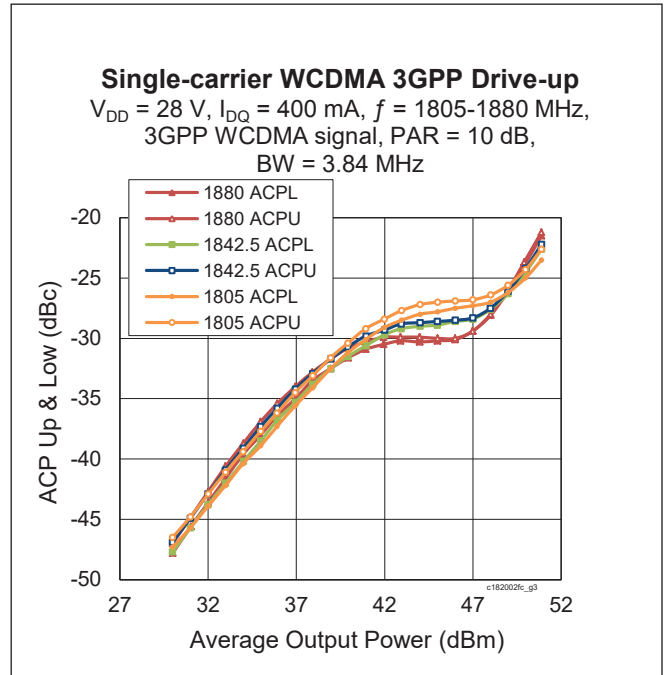
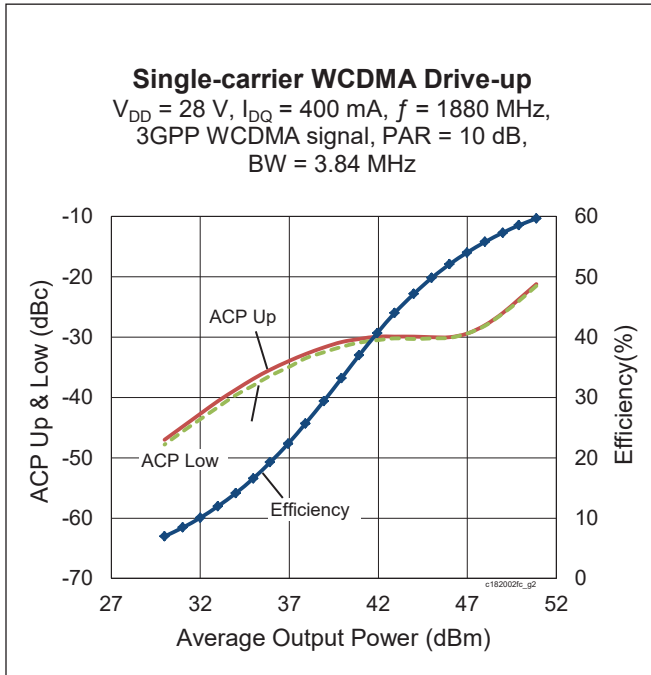
Maximum Ratings

| Parameter | Symbol | Value | Unit |
|----------------------------------------------------------------------|----------------------------------------------------|-----------------|-----------------------------|
| Drain-Source Voltage | V_{DSS} | 65 | V |
| Gate-Source Voltage | V_{GS} | -6 to +10 | V |
| Operating Voltage | V_{DD} | 0 to +32 | V |
| Junction Temperature | T_J | 225 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to +150 | $^{\circ}\text{C}$ |
| Thermal Resistance (main, $T_{CASE} = 70^{\circ}\text{C}$, 28 W CW) | $R_{\theta JC}$ | 1.088 | $^{\circ}\text{C}/\text{W}$ |
| | (peak, $T_{CASE} = 70^{\circ}\text{C}$, 100 W CW) | $R_{\theta JC}$ | 0.587 |

Ordering Information

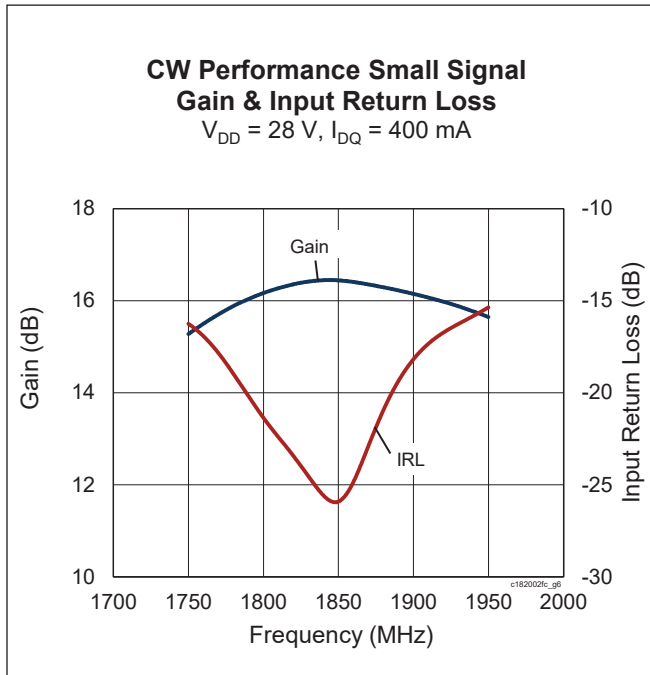
| Type and Version | Order Code | Package Description | Shipping |
|----------------------|----------------------|---------------------------|----------------------|
| PXAC182002FC V1 R0 | PXAC182002FC-V1-R0 | H-37248-4, earless flange | Tape & Reel, 50 pcs |
| PXAC182002FC V1 R250 | PXAC182002FC-V1-R250 | H-37248-4, earless flange | Tape & Reel, 250 pcs |

Typical Performance (data taken in a production test fixture)





Typical Performance (cont.)



Load Pull Performance

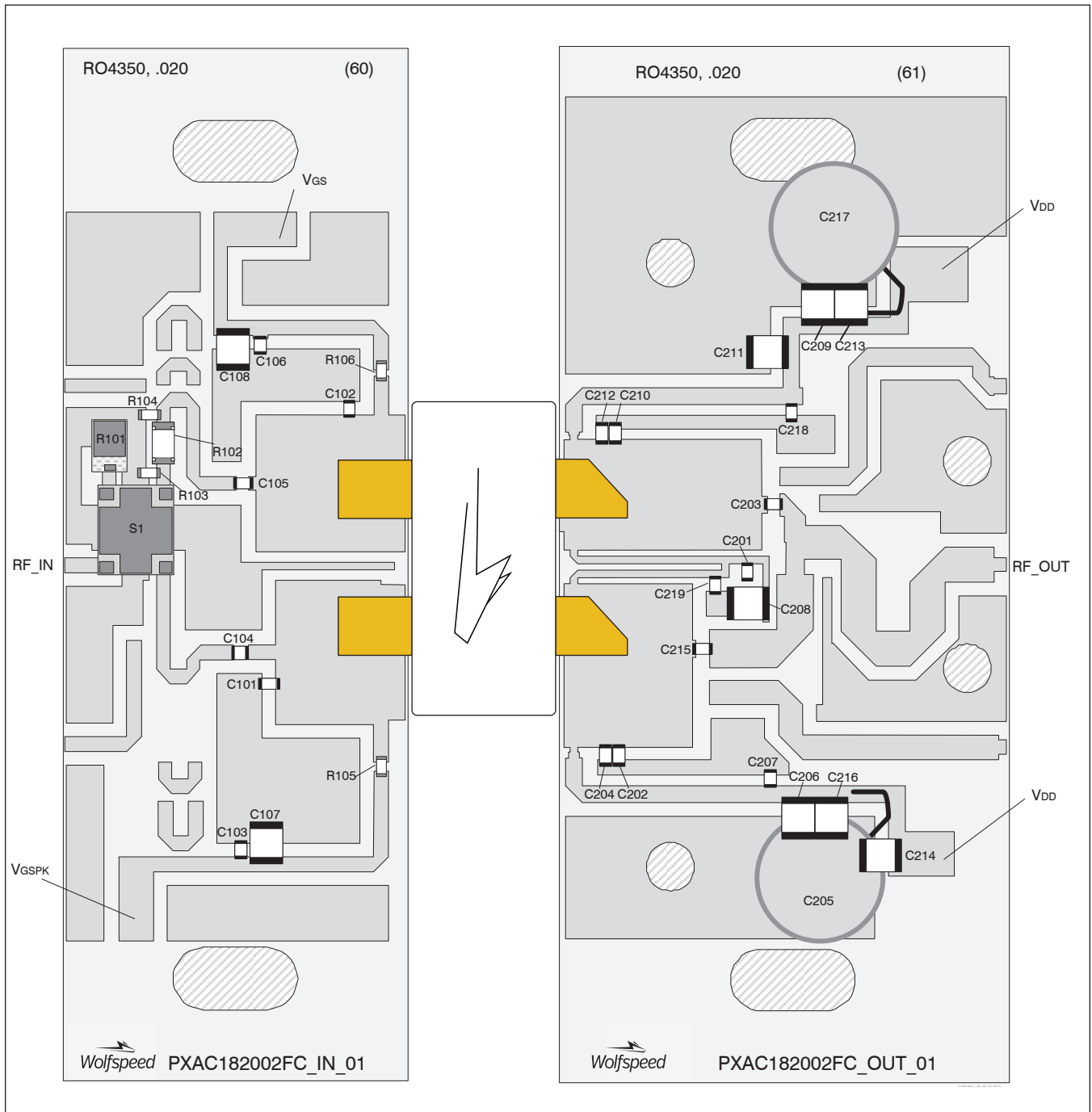
Main Side Load Pull Performance – Pulsed CW signal: 160 μs , 10% duty cycle, 28 V, $I_{DQ} = 405\text{ mA}$

| | | P_{1dB} | | | | | | | | | |
|-------------------|--------------------------------------------|--------------------------------------------|------------------|------------------------------|----------------------------|--------------------------------|--------------------------------------------|------------------|------------------------------|----------------------------|--------------------------------|
| | | Max Output Power | | | | | Max Drain Efficiency | | | | |
| Freq [MHz] | Z_s [Ω] | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] |
| 1810 | 3.94 – j10.15 | 2.92 – j5.27 | 19.2 | 49.4 | 86 | 54.0 | 6.49 – j2.19 | 21.9 | 47.2 | 52 | 66.6 |
| 1840 | 5.13 – j10.93 | 2.93 – j4.16 | 19.5 | 49.3 | 85 | 57.6 | 5.82 – j2.44 | 21.7 | 47.5 | 56 | 66.3 |
| 1880 | 5.90 – j12.44 | 2.73 – j5.17 | 19.2 | 49.5 | 89 | 55.2 | 4.53 – j2.29 | 21.5 | 47.7 | 59 | 67.9 |

Peak Side Load Pull Performance – Pulsed CW signal: 160 μs , 10% duty cycle, 28 V, $I_{DQ} = 685\text{ mA}$

| | | P_{1dB} | | | | | | | | | |
|-------------------|--------------------------------------------|--------------------------------------------|------------------|------------------------------|----------------------------|--------------------------------|--------------------------------------------|------------------|------------------------------|----------------------------|--------------------------------|
| | | Max Output Power | | | | | Max Drain Efficiency | | | | |
| Freq [MHz] | Z_s [Ω] | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] | Z_l [Ω] | Gain [dB] | P_{OUT} [dBm] | P_{OUT} [W] | η_D [%] |
| 1810 | 3.71 – j9.13 | 4.64 – j5.44 | 20.5 | 50.9 | 123 | 55.5 | 3.52 – j2.84 | 22.7 | 49.7 | 94 | 66.2 |
| 1840 | 4.76 – j8.65 | 4.66 – j5.68 | 20.6 | 50.7 | 117 | 54.5 | 3.39 – j3.01 | 23.2 | 49.2 | 84 | 64.1 |
| 1880 | 6.40 – j9.13 | 4.63 – j5.74 | 20.8 | 50.7 | 116 | 54.3 | 2.83 – j3.50 | 23.1 | 49.2 | 83 | 64.3 |

Reference Circuit , 1805 – 1880 MHz



Reference circuit assembly diagram (not to scale)



Reference Circuit (cont.)

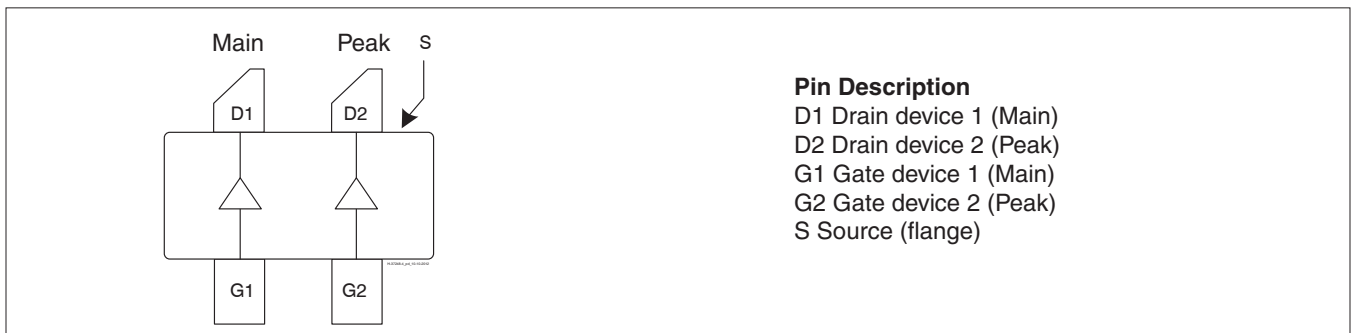
Reference Circuit Assembly

| | |
|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| DUT | PXAC182002FC V1 |
| Test Fixture Part No. | LTA/PXAC182002FC V1 |
| PCB | Rogers 4350, 0.508 mm [0.020"] thick, 2 oz. copper, $\epsilon_r = 3.66$, $f = 1805 - 1880$ MHz |
| Find Gerber files for this test fixture on the Wolfspeed Web site at www.wolfspeed.com/RF | |

Components Information

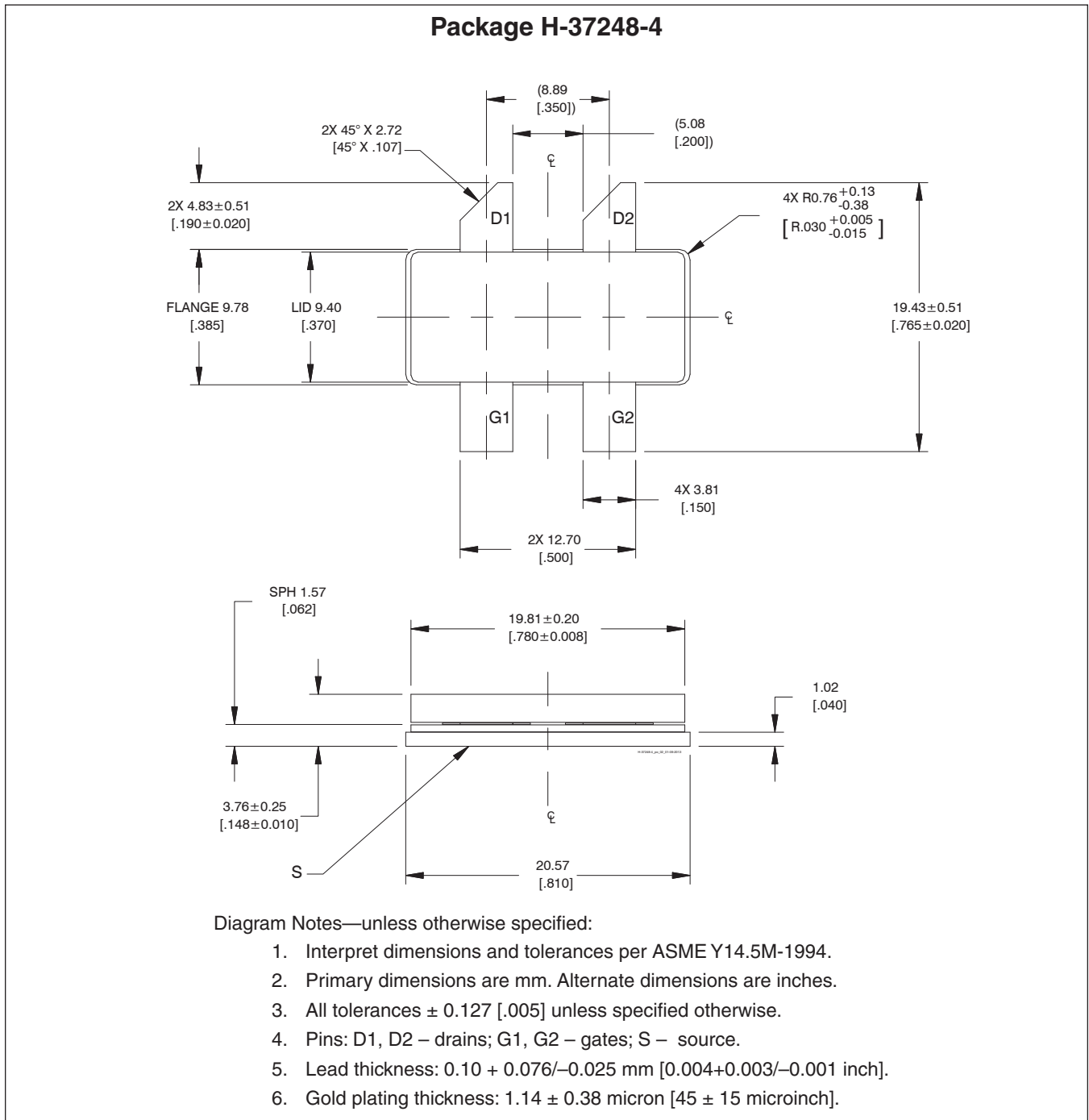
| Component | Description | Manufacturer | P/N |
|------------------------------------------|------------------------|---------------------------------|-------------------|
| Input | | | |
| C101 | Capacitor, 1.2 pF | ATC | ATC600F1R2CW250T |
| C102 | Capacitor, 0.5 pF | ATC | ATC600F0R5CW250T |
| C103, C104, C105, C106 | Capacitor, 18 pF | ATC | ATC600F180JW250T |
| C107, C108 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| R101 | Resistor, 50 Ω | Richardson | C8A50Z4A |
| R102 | Resistor, 18 ohms | Panasonic Electronic Components | ERJ-8GEYJ180V |
| R103, R104 | Resistor, 301 Ω | Venkel | CR0603-16W-3010FT |
| R105, R106 | Resistor, 10 Ω | Panasonic Electronic Components | ERJ-3GEYJ100V |
| S1 | Hybrid Coupler | Anaren | X3C19P1-03S |
| Output | | | |
| C201, C207, C215, C218, C219 | Capacitor, 18 pF | ATC | ATC600F180JW250T |
| C202 | Capacitor, 0.8 pF | ATC | ATC600F0R8AW250T |
| C203 | Capacitor, 5.1 pF | ATC | ATC600F5R1AW250T |
| C204 | Capacitor, 1.6 pF | ATC | ATC600F1R6AW250T |
| C205, C217 | Capacitor, 220 μ F | Cornell Dubilier Electronics | SK221M050ST |
| C206, C208, C209, C211, C213, C214, C216 | Capacitor, 10 μ F | Taiyo Yuden | UMK325C7106MM-T |
| C210 | Capacitor, 0.5 pF | ATC | ATC600F0R5AW250T |
| C212 | Capacitor, 1.6 pF | ATC | ATC600F1R6AW250T |

Pinout Diagram (top view)



Lead connections for PXAC182002FC

Package Outline Specifications



Revision History

| Revision | Date | Data Sheet Type | Page | Subjects (major changes since last revision) |
|----------|------------|-----------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01 | 2014-09-23 | Advance | All | Data Sheet reflects advance specification for product development |
| 02 | 2015-03-24 | Production | All All | Data Sheet reflects released product specification Revised all data and includes updated final specs, typical performance graphs, loadpull, reference circuit, package outline |
| 02.1 | 2015-05-20 | Production | 1 | Updated single-carrier WCDMA test spec |
| 02.2 | 2015-06-05 | Production | 1 | Corrected I/O in description paragraph, removed f_1 from single-carrier WCDMA test spec condition |
| 02.3 | 2016-06-17 | Production | 1, 2 | Updated ESD rating and ordering information to include R0 |
| 03 | 2018-06-25 | Production | All | Converted to Wolfspeed Data Sheet |

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Notes

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